



Jet Propulsion Laboratory
California Institute of Technology

2018-12-19 Rotisserie Tests of CGI Pupil Shear in Phase A Observatory Model

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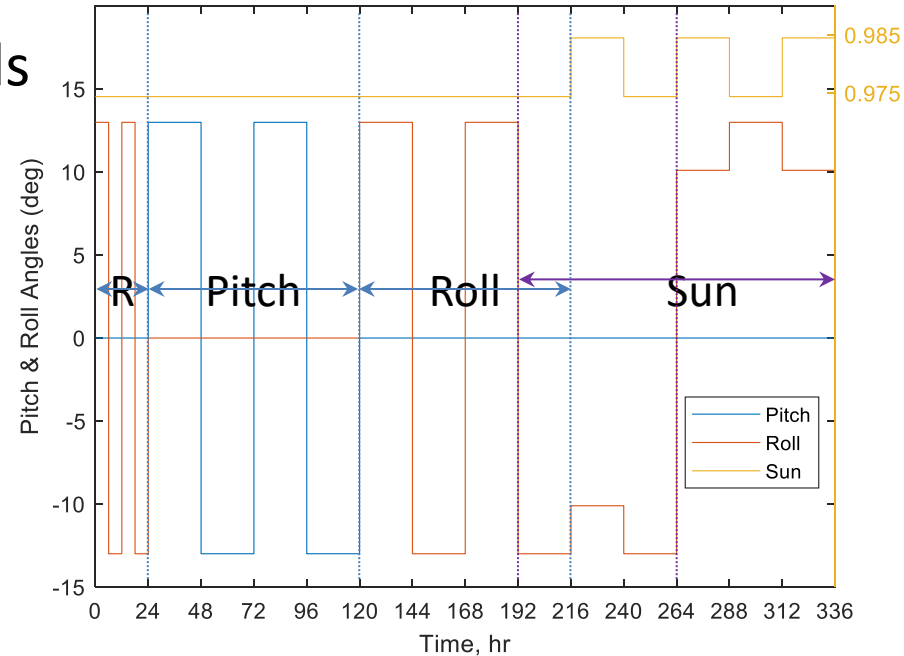
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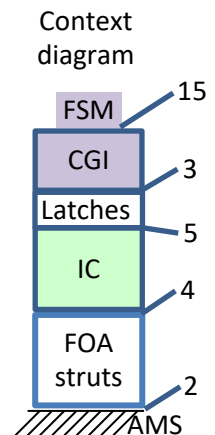


“Rotisserie” Scenario

- Begin with “palate cleansing” rolls
- Then two cycles of $\pm 13^\circ$ pitch
 - LOS toward/away from sun
 - 1 day each side, to see settling time
- Then two cycles of $\pm 13^\circ$ roll
- Then 3 full cycles of change in sun angle on solar panels
 - Rolls -13, -10, -13, +10, +13, +10
- We’ll use this key to mark the time periods of each of these experiments
 - Appears on each plot
- Using Phase A (SRR) Observatory IM (Nov 2017 – Feb 2018)

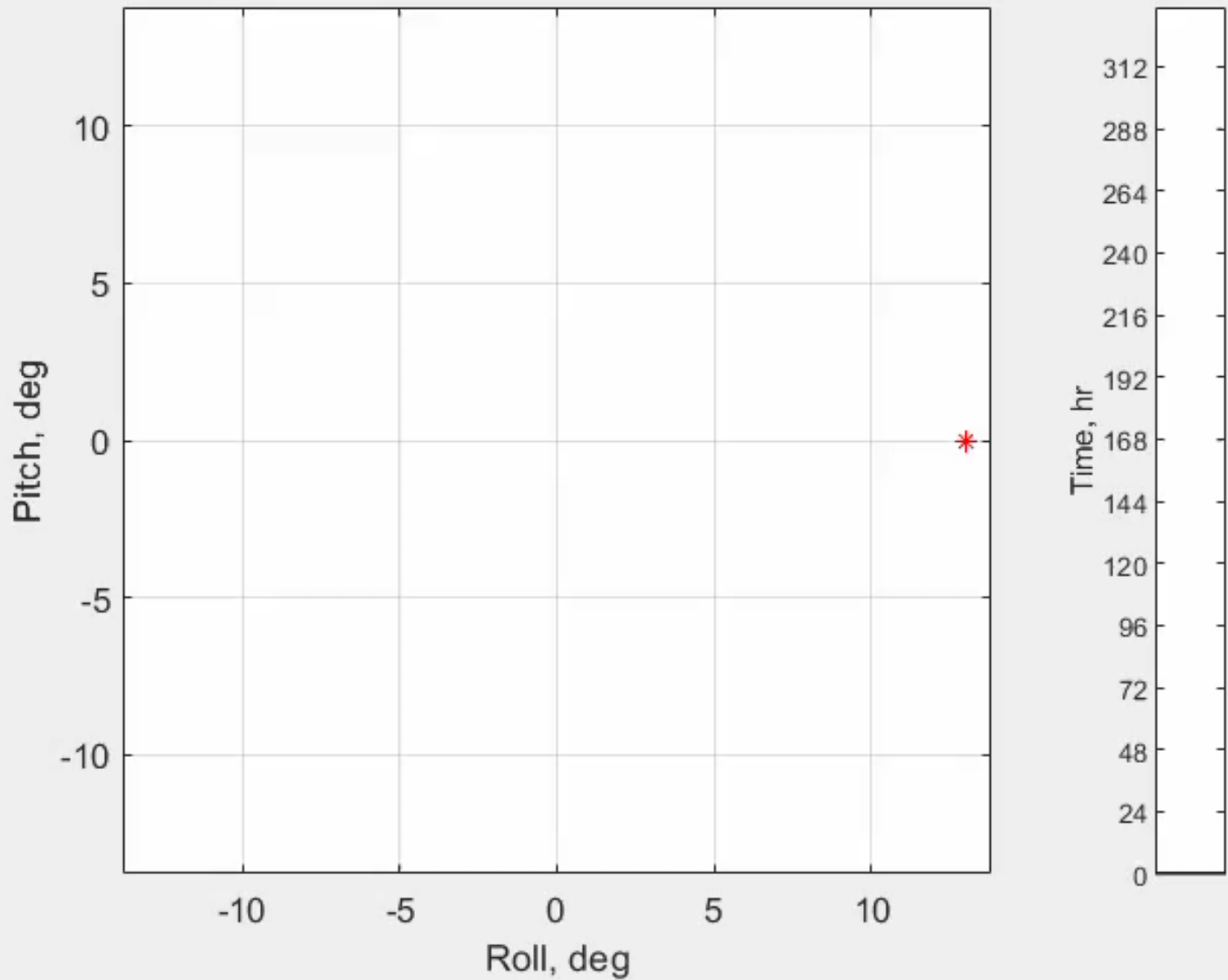


Surf #	Description
2	TOMA-AMS interface, proxy for the Payload Coordinate System
3	CGI-IC interface, CGI side of latches
4	IC-IOA interface, bottom of FOA struts, where they meet IC
5	CGI-IC interface, IC side of latches
15	CGI-FSM_prx, at or near the FSM





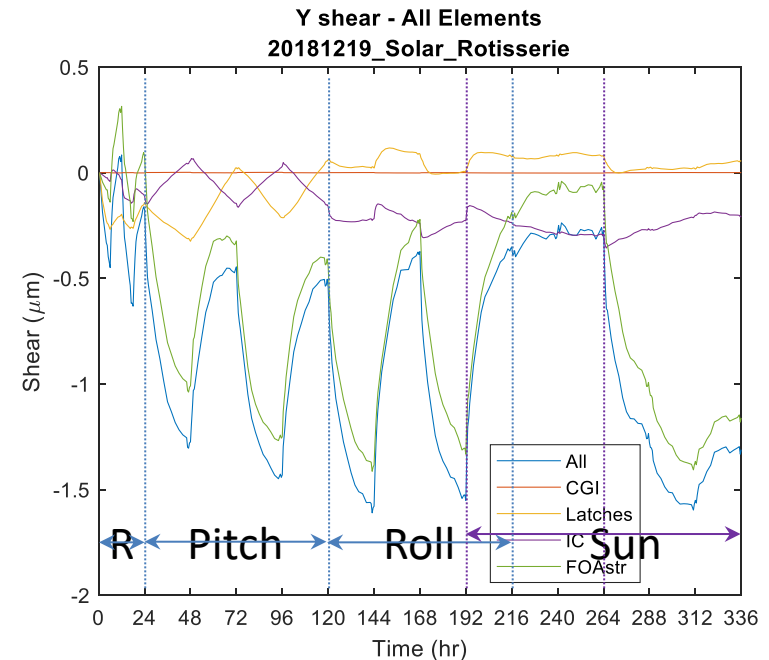
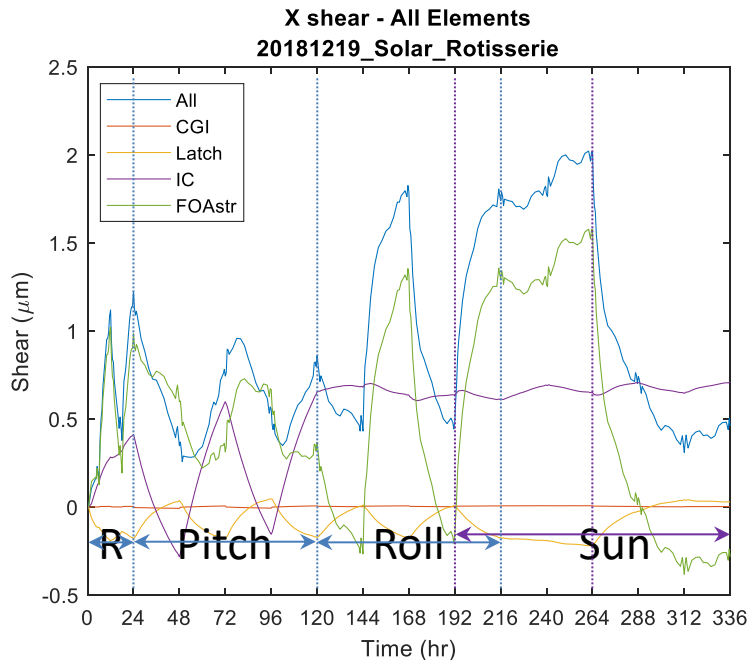
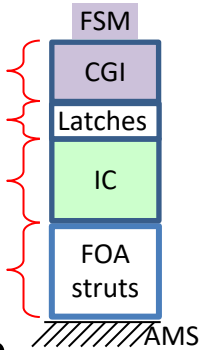
Sun Vectors vs. Time





Shear X, Y attributed to each element of the metering path

- Breakdown to segments of mechanical metering path
- Shows the physics we were looking for
 - Pitch and roll sensitivities are linear, not quadratic, and similar in size
 - “FOA struts” terms dominate, and behave differently for X,Y shear





Conclusions

- Linear response of shear components to pitch and roll means there's a gradient of final shear (after settling) vs. attitude
- We can design an OS7 to occupy attitudes that span less of this gradient, or alternate more quickly in the slower-settling axes
- These linear responses must mostly originate in the bus somehow
 - Thermal through D-struts?
 - Bus top deck imparting distortions to IC through D-struts?
- If the linear coefficients could be reduced by design changes, that would relieve the need for constraints such as
 - Scheduling CGI observations to begin after preferred WFI orientations
 - Limiting which reference stars we can use in CGI observations



Sun Vectors vs. Time – OS6

